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**METHOD FOR THINNING SEMICONDUCTOR WAFERS WITH CIRCUITS
AND WAFERS MADE BY THE SAME**

Abstract of the Disclosure

5 Thinned and/or flexible integrated circuit chips are fabricated by defining a plurality of grooves into the front surface of a semiconductor wafer. The grooves isolate each integrated circuit into a separate die. The pre-scribed grooves extend only partially into the front surface in which the circuits are formed, typically 50 microns or less. A polyimide planarizing and stress relieving layer is
10 disposed on the front surface before the grooves are grooved. A low viscosity low stress adhesive is disposed on the grooved polyimide coated surface. The wafer is then bonded to the scored surface of an optically flat glass substrate under pressure and at a curing temperature. The assembly is then mounted into a grinder which removes the backside portion of the wafer until the grooves are
15 exposed. Grinding is achieved by advancing at a decreasing grind rate followed by periods of dwell. The grooves in the semiconductor wafer tend to inhibit crack formation and when cracks do occur they propagate to the die street limitations and are thus confined to a single die. The assembly is then placed backside down on a pin block in a solvent bath. The solvent dissolves the adhesive layer
20 leaving the separated dies of the pin block for mounting on a flexible film. The dies are coupled to metalizations on the flexible film by means of a conductive epoxy and sealed using a flexible coating.